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Subject: Background Statement on Castor Beans

Field Distribution: War Board Members, Extension Editors, BAE Analysts, FDA Marketing Reports Chiefs, SCS, FSA, FCA Regional Information Chiefs

Suggested Use: Background Information

Two major objectives actuated the castor bean program in 1943: 1) to get an adequate seed supply for possible future needs and so be prepared for any emergency that might arise, and 2) to gain experience in the proper methods of production and determine localities where the plant can be best grown.

Castor oil, processed from the seeds --- erroneously called beans --- of the castor oil plant (Palma Christi or mole bean) can be processed to make a quick-drying oil suitable as a substitute for tung oil and other quick-drying paint oils. Tung oil no longer can be obtained from China, the only source of supply in the quantity needed. Brazilian oiticica oil, another substitute for tung oil, also is in very short supply as a result of crop failures in 1942 and 1943. Castor oil is also needed for marine engines, dynamos, electrical work and other uses which require oil completely impervious to moisture.

The strong demand for quick-drying oils in the manufacture of paints and varnishes for war needs, and heavy requirements for certain other highly specialized technical uses to which castor oil is well adapted, have created a need for large quantities of the oil. However, Brazil now groups the castor bean in sufficient amounts to supply immediate oil needs as long as shipping is not cut off. Should this happen, we might become dependent upon our own plants.

The castor bean program began in 1941. Incidental efforts had been made to grow castor beans over a period of years. Plantings during World War I, brought about by a now out-moded demand for the oil as a common lubricant in airplane motors, were not successful. Experiments in garden plots later showed that castor beans could be raised widely and successfully throughout the United States. It also became apparent, however, that while castor bean plants will show a luxuriant growth, getting beans with good oil content, or even beans, is another matter.

In 1941 experiments were carried on by the Texas Power and Light Co., already at work in Texas on a study of the beans, at the request of the U. S. Department of Agriculture. The following year, 1942, a fairly extensive program was begun among farmers. Failure to follow directions on the new crop, rather than land or climate, is believed to have been responsible for the lack

of success of some, since Texas, Kansas and Tennessee plantings were highly successful. It now was evident that the castor bean could become an American oil crop. Unsatisfactory machinery had been an early hindrance, and during this period hullers were developed which could do an adequate job.

Program Arranged

The 1943 castor bean planting was limited to 10,901 acres, in Texas, Oklahoma, Kansas, Arkansas, Tennessee, Kentucky, Illinois, Indiana and Missouri. The Bureau of Plant Industry and the Agricultural Adjustment Agency cooperated in choosing suitable land and making contacts with growers. Funds to finance the program of experimentation and seed growth for storage were furnished by the Commodity Credit Corporation.

On the limited acreage all planting in 1943 is for the purpose of increasing certain varieties of pure seed and none at the present time specifically for oil purposes. The relatively small but significant seed increase program, of necessity limited to certain area and varieties, is a "seed insurance plan" to produce seed of uniform varieties for planting in 1944 or 1945 should the domestic need become urgent.

Production of castor beans in 1943 is estimated at 2,792,750 pounds in the hull. For seeds that shell out 70 percent (average), the guaranteed support price is $6.00 per hundred pounds or 6¢ a pound for the beans in the hull. The price varies upward or downward dependent upon the shelling out percentage. This price is for seed beans, not industrial beans, and is higher than the usual price for beans for oil and other uses. Income from the 1943 crop is estimated at $166,665 from a little more than 10,000 acres --- about $16.50 per acre. Farmers pay about one percent for seed costs.

Plans for 1943 originally called for 10,000 acres in castor beans, and seed was finally allocated for acreages in the following states: Texas, 2,150; Oklahoma, 2,000; Tennessee, 1,438; Kansas, 1,233; Illinois, 1,150; Kentucky, 1,000; Missouri, 1,000 and Indiana, 930 acres. This totals 10,901 acres. Plantings in 1942 totaled 7,980 acres.

Average return per acre in 1942 was 250 pounds of beans in the hull. Kentucky showed a high production of 490 pounds per acre, Indiana being next with 410. Texas was lowest with 180 pounds. Other production per acre was Tennessee, 364 pounds; Illinois, 318 pounds; Missouri, 297; Oklahoma, 231, and Kansas, 215.

After putting aside estimated seed requirements from the 1942 crop, about 136,000 pounds of beans (cleaned and hulled) went to industry for crushing. It is possible that some of this seed may be called back from the crushers for shipment to Russia.

A cooperative program is now under way with Mexico to plant 75,000 acres of castor beans. Seed has been bought from the United States and this country will buy the beans at $75 per long ton delivered at Laredo, Texas. Mexico has

been growing castor beans to some extent but of an unimproved variety.

Total castor oil requirements in the United States in 1942 were an estimated 155,000,000 pounds. This was a decrease from the 1941 requirements of about 3,000,000 pounds. Oil use had jumped in 1941 to nearly 158,000,000 pounds from 90,000,000 in 1940.

Many Uses Reported

Industrial uses of the castor bean are varied. The dehydrated oil is replacing tung oil in paints and varnishes for military equipment where waterproofing is of paramount importance. It is also used as hydraulic brake fluid for tanks and military trucks. Castor oil has value as a lubricant because of its ability to stick to exposed surfaces, and is especially suitable for high speed electric motors. Petroleum products have replaced castor oil as a lubricant for airplane engines, but it is still used in special airplane engine tests. Cylinders of some rotary, air-cooled gasoline engines are lubricated by spraying castor oil into the cylinders with gasoline.

Sulfonated castor oil has two important war uses. It is employed in dyeing cotton fabric to help materials for uniforms retain their original color, faded uniforms being more conspicuous to the enemy. It is also used in making a drug called Smear 62, for external use on wounds to control the screwworm, the blowfly, and the wool maggot which annually cause the loss of millions of dollars on cattle and sheep ranches in the Southwest.

Other industrial uses for castor oil are in making artificial leather, flypaper, linoleum, and special inks. Army shoe linings are often softened by castor oil, and it can be employed as an efficient binder for incendiary bombs.

Three varieties of castor beans of a uniform type have been grown in the United States in sufficient quantity to be of commercial significance. They are known as Doughty 11, Conner and Kentucky 38. On the basis of average yields, Conner has given best results in the central and northern part of the region extending from Northern Texas, Oklahoma and Kansas eastward to the Atlantic Coast. Doughty 11 gave best results in southern Texas where the variety was developed. Kentucky 38 thrived in Illinois and Kentucky.

Contain Poisonous Material

Castor beans are poisonous to most people and livestock, if eaten. Little or none of the toxic principle of the seed is extracted from the oil by certain methods, but oil for medicinal purposes is further processed to remove any poison or extraneous materials. The pressed cake left after the oil has been extracted contains the poisonous constituents of the seed and should never be fed to livestock as are soybean meal and the residues from other vegetable oil processing. Some efforts have been made by industrial experiment to prepare insecticides and sprays from ricin, the toxic substance in the castor bean, but

their success as "bug killers" is nullified by their dangerous qualities.

No castor bean program such as was carried on in 1943 is planned in 1944, as sufficient seed is in reserve for emergency planting needs. There is no necessity at present to grow the beans for oil, as import conditions from Brazil have been improving instead of getting worse.

It is the consensus that castor beans are a good product to continue as an import, since bringing them in is cheaper than growing the plants at home under present conditions. The United States would never raise castor beans except as a war crop, it is believed, because tung oil for which castor oil is a replacement will be imported again after the war, and castor beans or oil probably will be available from India, Italy and other foreign sources in addition to Brazil.

It is important to note that the United States could grow a major part of the castor beans needed for oil in this country if it were necessary. The 10,901 acres of seed this year, for example, would have produced approximately 140,000 pounds of oil, although these beans were being grown for seed purposes. Production per acre of beans for oil could be stepped up by experiments in growing methods and production of special seed.

Castor beans grow in almost any soil, but are subject to attack by insects and plant diseases and so must be carefully watched. They require less cultivation than cotton or corn, but must be kept free of weeds for a good yield. Ground is prepared for planting much the same as for cotton or corn. Most corn and cotton planters can easily adapt themselves to growing castor beans.